



TABLE III
DNA Sequence and Primary Amino Acid Structure of a Representative
Full Length TM Molecule

5 -2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
 asp gln glu asp glu arg ile val leu val asp asn lys cys lys cys ala arg
 gat cag gaa gat gaa cgt att gtt ctg gtt gac aac aag tgc aag tgt gtc cgt
 cta gtc ctt cta ctt gca taa caa gac caa ctg ttg ttc acg ttc aca cga gca
 10 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34
 ile thr ser arg ile ile arg ser ser glu asp pro asn glu asp ile val glu
 att act tct aga atc atc cgt agc tca gag gac cca aat gaa gat ata gtc gaa
 taa tga aga tct tag tag gca tcg agt ctc ctg ggt tta ctt cta tat cag ctt
 15 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
 arg asn ile arg ile ile val pro leu asn asn arg glu asn ile ser asp pro
 cgt aac atc cgt atc atc gtc cca ctg aat aac cgg gag aat atc tca gat cct
 gca ttg tag gca tag tag cag ggt gac tta ttg gcc ctc tta tag agt cta gga
 20 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70
 thr ser pro leu arg thr arg phe val tyr his leu ser asp leu cys lys lys
 aca agt ccg ttg cgc aca cgc ttc gta tac cac ctg tca gat ctg tgt aag aag
 tgt tca ggc aac gcg tgt gcg aag cat atg gtg gac agt cta gac aca ttc ttc
 25 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88
 cys asp pro thr glu val glu leu asp asn gln ile val thr ala thr gln ser
 tgt gat cca aca gag gta gag ctg gac aat cag ata gtc act gcg act caa agc
 aca cta ggt tgt ctc cat ctc gac ctg tta gtc tat cag tga cgc tga gtt tcc
 30 89 90 91 92 93 94 95 96 97 99 100 101 102 103 104 109 110 111
 asn ile cys asp glu asp ser ala thr glu thr cys ser thr tyr asp arg asn
 aac att tgc gat gag gac agc gct aca gaa acc tgc agc acc tac gat agg aac
 ttg taa acg cta ctc ctg tcg cgt ctt tgg acg tcg tgg atg cta tcc ttg
 35 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129
 lys cys tyr thr ala val val pro leu val tyr gly gly glu thr lys met val
 aaa tgc tac acg gcc gtc gtt ccg ctc gtc tat ggt gga gag aca aaa atg gtc
 ttt acg atg tgc cgg cac caa ggc gag cac ata cca cct ctc tgt ttt tac cac
 40 130 131 132 133 134 135 136 137 138 139 140 141
 glu thr ala leu thr pro asp ala cys tyr pro asp OPA
 (SEQ ID NO:17)
 gaa act gcc ctt acg ccc gat gca tgc tat ccg gac tga attc
 (SEQ ID NO:7)
 ctt tga cgg gaa tgc ggg cta cgt acg ata ggc ctg act taag
 (SEQ ID NO:27)

TABLE IV
Oligonucleotides for Construction of Representative Partial TM Genes

5	<u>OLIGO</u>	<u>SEQUENCE</u>
	1:	gat cag gaa gat gaa cgt att gtt ctg gtt gac aac aag tgc aag tgt gct cgt att act t (SEQ. ID NO:46)
10	2:	cta gaa gta ata cga gca cac ttg cac ttg ttg tca acc aga aca ata cgt tca tct tcc t (SEQ ID NO:47)
	1.1:	gat cag aag tgc aag tgt gct cgt att act t (SEQ ID NO:48)
15	2.1	ct aga agt aat acg agc aca ctt gca ctt ct (SEQ ID NO:49)
	1.2ser:	gat cag gaa gat gaa cgt att gtt ctg gtt gac aac aag tgc aag tcc gct cgt att act t (SEQ ID NO:50)
20	2.2ser:	cta gaa gta ata cga gcg gac ttg cac ttg ttg tca acc aga aca ata cgt tca tct tcc t (SEQ ID NO:51)
	1.2val:	gat cag gaa gat gaa cgt att gtt ctg gtt gac aac aag tgc aag gtt gct cgt att act t (SEQ ID NO:52)
25	2.2val:	cta gaa gta ata cga gca acc ttg cac ttg ttg tca acc aga aca ata cgt tca tct tcc t (SEQ ID NO:53)
	3:	cta gaa tca tcc gta gct cag agg acc caa atg aag ata tag tcg aa (SEQ ID NO:54)
30	4	gat acg gat gtt acg ttc gac tat atc ttc att tgg gtc ctc tga gct acg gat gat t (SEQ ID NO:55)
	5:	cgt aac atc cgt atc atc gtc cca ctg aat aac cgg gag aat atc tca g (SEQ ID NO:56)

5 5.1dg: cgt aac atc cgt atc atc gtc cca ctg aat aac cgg gag cac
atc tca g (SEQ ID NO:57)

6: acg gac ttg tag gat ctg aga tat tct ccc ggt tat tca gtg
gga cga t (SEQ ID NO:58)

10

6.1dg: acg gac ttg tag gat ctg aga tgt gct ccc ggt tat tca gtg
gga cga t (SEQ ID NO:59)

7: atc cta caa gtc cgt tgc gca cac gct tcg tat acc acc tgt
15 ca (SEQ ID NO:60)

8: gat ctg aca ggt ggt ata cga agc gtg tgc gca
(SEQ ID NO:61)

20 9: gat ctg tgt aag aag tgt gat cca aca gag gta gag ctg gac
aat cag ata gtc act gca (SEQ ID NO:62)

9L3Δ: gat ctg tgt aag aag gat gag gac agc gct aca gaa acc tgc
tg (SEQ ID NO:63)

25

10L3Δ: aat tca gca ggt ttc tgt agc gct gtc ctc atc ctt ctt aca
ca (SEQ ID NO:64)

9L3ΔKDEL: gat ctg tgt aag aag gat gag gac agc gct aca gaa acc tgc
30 tac gag aag gat gag ctg tg (SEQ ID NO:65)

10L3ΔKDEL: aat tca cag ctc atc ctt cgc gtc gca ggt ttc tgt agc gct
gtc ctc atc ctt ctt aca ca (SEQ ID NO:66)

35 9.2Δ3: gat ctg tgt aag aag tct gat atc gat gaa gat tcc gct aca
gaa acc tgc agc aca tg (SEQ ID NO:67)

10.2Δ3: aat tca tgt gct gca ggt ttc tgt agc gga atc ttc atc gat
atc aga ctt ctt aca ca (SEQ ID NO:68)

40

5 9.3Δ3/ser68: gat ctg tct aag aag tct gat atc gat gaa gat tac aga ttc
ttc aga cta tag cta ctt cta a (SEQ ID NO:69)

10.3Δ3/ser68: aat ctt cat cga tat cag act tct tag aca (SEQ ID NO:70)

10 9.3Δ3/val68: gat ctg gtt aag aag tct gat atc gat gaa gat tac caa ttc
ttc aga cta tag cta ctt cta a (SEQ ID NO:71)

10.3Δ3/val68: aat ctt cat cga tat cag act tct taa cca (SEQ ID NO:72)

15 10: att gtc cag ctc tac ctc tgt tgg atc aca ctt ctt aca ca
(SEQ ID NO:73)

11: act caa agc aac att tgc gat gag gac agc gct aca gaa acc
tgc a (SEQ ID NO:74)

20 12: ggt ttc tgt agc gct ctg ctc atc gca aat gtt gct ttg agt
cgc agt gac tat ctg (SEQ ID NO:75)

13: gc acc tac gat agg aac aaa tgc tac acg gcc gtg gtt ccg
25 ctc gtg tat ggt gga gag (SEQ ID NO:76)

14: gag cgg aac cac ggc cgt gta gca ttt gtt cct atc gta ggt
gct gca (SEQ ID NO:77)

30 15: aca aaa atg gtg gaa act gcc ctt acg ccc gat gca tgc tat
ccg gac tg (SEQ ID NO:78)

16: aat tca gtc cgg ata gca tgc atc ggg cgt aag ggc agt ttc
cac cat ttt tgt ctc tcc acc ata cac (SEQ ID NO:79)

35 15KDEL: aca aaa atg gtg gaa act gcc ctt acg ccc gat gca tgc tat
ccg gac aag gat gaa ttg tg (SEQ ID NO:80)

16KDEL: aat tca caa ttc atc ctt gtc cgg ata gca tgc atc ggg cgt
40 aag ggc agt ttc cac cat ttt tgt ctc tcc acc ata cac
(SEQ ID NO:81)

5

P1: gat cag gtc gct gcc atc caa gac ccg agg ctg ttc gcc gaa
gag aag gcc gtc gct gac tcc aag tgc aag tgt gct cgt att
act t (SEQ ID NO:82)

10

P2: ct aga agt aat acg agc aca ctt gca ctt gga gtc agc gac
ggc ctt ctc ttc ggc gaa cag cct cgg gtc ttg gat ggc agc
gac ct (SEQ ID NO:83)

Tp1: gc gat gac gac gat aag gcc caa acg gag acc tgt act gtt gcg cct
15 cgt gaa cgg caa aac tgc gga ttc ccg gaa (SEQ ID NO:103)

Tp2: gtt ttg ccg ttc acg agg cgc aac agt aca ggt ctc cgt ttg ggc ctt
atc gtc gtc atc gct tca (SEQ ID NO:104)

20

Tp3: gta aca ccc tct cag tgc gct aat aaa ggc tgc tgt ttt gat gac acg
gta cgg ggc gtt ccg tgg tgc ttc (SEQ ID NO:105)

Tp4: gcc ccg tac cgt gtc atc aaa aca gca gcc ttt att agc gca ctg aga
ggg tgt tac ttc cgg gaa tcc gca (SEQ ID NO:106)

25

Tp5: tac ccc aat aca att gac gtt ccg cct gaa gaa gag tgc gag ccg taa g
(SEQ ID NO:107)

Tp6: aattc tta cgg ctc gca ctc ttc agg cgg caa gtc aat tgt

30

att ggg gta gaa gca cca cgg aac (SEQ ID NO:108)

TABLE V

Peptide and DNA sequence of Domain C2 of TM (TM aa residues 19-65)

TABLE VI

30 DNA sequence and primary amino acid structure of Domain D1.1 of TM
(TM aa residues 9-20)

TABLE VI.A
DNA sequence and primary amino acid structure of Domain D1 of TM
(TM aa residues -2-20)

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5  -2   -1   1   2   3   4   5   6   7   8   9   10  11  12  13  14  15
asp gln glu asp glu arg ile val leu val asp asn lys cys lys cys ala
gat cag gaa gat gaa cgt att gtt ctg gtt gac aac aag tgc aag tgt gct
tc ctt cta ctt gca taa caa gac caa ctg ttg ttc acg ttc aca cga

10 16  17  18  19  20
.
arg ile thr ser arg (SEQ ID NO:25)
cgt att act t (SEQ ID NO:15)
gca taa tga aga tc (SEQ ID NO:35)

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TABLE VII
Peptide and DNA sequence of Domain L3Δ of TM (TM aa residues 66-70 and 92-101)

TABLE VII.A
Peptide and DNA sequence of Domain L3 of TM (TM aa residues 66-101)

5	66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81
	asp leu cys lys lys cys asp pro thr glu val glu leu asp asn gln
	gat ctg tgt aag aag tgt gat cca aca gag gta gag ctg gac aat cag
	cta gac aca ttc ttc aca cta ggt tgt ctc cat ctc gac ctg tta gtc
10	82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
	ile val thr ala thr gln ser asn ile cys asp glu asp ser ala thr
	ata gtc act gcg act caa agc aac att tgc gat gag gac agc gct aca
	tat cag tga cgc tga gtt tcg ttg taa acg cta ctc ctg tcg cga tgt
15	100
	glu thr cys (SEQ ID NO:24)
	gaa acc tgc (SEQ ID NO:14)
	ctt tgg acg (SEQ ID NO:34)
20	

TABLE VIII
DNA and Primary Amino Acid Sequence of T4 Fragment (TM aa residues 102-141)

25	102 103 104 109 110 111 112 113 114 115 116 117 118 119 120 121
	ser thr tyr asp arg asn lys cys tyr thr ala val val pro leu val
	gc acc tac gat agg aac aaa tgc tac acg gcc gtg gtt ccg ctc gtg
	acg tcg tgg atg cta tcc ttg ttt acg atg tgc cgg cac caa ggc gag cac
30	122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138
	tyr gly gly glu thr lys met val glu thr ala leu thr pro asp ala cys
	tat ggt gga gag aca aaa atg gtg gaa act gcc ctt acg ccc gat gca tgc
	ata cca cct ctc tgt ttt tac cac ctt tga cgg gaa tgc ggg cta cgt acg
35	139 140 141
	tyr pro asp OPA (SEQ ID NO:22)
	tac cct gac tg (SEQ ID NO:12)
	atg gga ctg act taa (SEQ ID NO:32)

TABLE IX
DNA Sequence and Primary Amino Acid Sequence of a
Representative TM Core Element

9	10	11	12	13	14	15	16	17	18	19									
	asp	gln	lys	cys	lys	cys	ala	arg	ile	thr	ser								
	gat	cag	aag	tgc	aag	tgt	gct	cgt	att	act	tct								
	cta	gtc	ttc	acg	ttc	aca	cga	gca	taa	tga	aga								
10																			
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36		
	arg	ile	ile	arg	ser	ser	glu	asp	pro	asn	glu	asp	ile	val	glu	arg	asn		
	aga	atc	atc	cgt	agc	tca	gag	gac	cca	aat	gaa	gat	ata	gtc	gaa	cgt	aac		
	tct	tag	tag	gca	tcg	agt	ctc	ctg	ggt	tta	ctt	cta	tat	cag	ctt	gca	ttg		
15																			
	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53		
	ile	arg	ile	ile	val	pro	leu	asn	asn	arg	glu	asn	ile	ser	asp	pro	thr		
	atc	cgt	atc	atc	gtc	cca	ctg	aat	aac	cgg	gag	aat	atc	tca	gat	cct	aca		
	tag	gca	tag	tag	cag	ggt	gac	tta	ttg	gcc	ctc	tta	tag	agt	cta	gga	tgt		
20																			
	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70		
	ser	pro	leu	arg	thr	arg	phe	val	tyr	his	leu	ser	asp	leu	cys	lys			
	agt	ccg	ttg	cgc	aca	cgc	ttc	gta	tac	cac	ctg	tca	gat	ctg	tgt	aag	aag		
	tca	ggc	aac	gcg	tgt	gct	aag	cat	atg	gtg	gac	agt	cta	gac	aca	ttc	ttc		
25																			
	92	93	94	95	96	97	99	100	101										
	asp	glu	asp	ser	ala	thr	glu	thr	cys	OPA	Eco	RI	(SEQ ID NO:18)						
	gat	gag	gac	agc	gct	aca	gaa	acc	tgc	tg	(SEQ ID NO:8)								
	cta	ctc	ctg	tcg	cga	tgt	ctt	tgg	acg	act	taa	(SEQ ID NO:28)							

TABLE XI
DNA and Primary Amino Acid Sequence of TpS2

5 101 102
cys ser asp asp asp lys ala gln thr glu thr cys thr val ala pro
gc gat gac gac gat aag gcc caa acg gag acc tgt act gtt gcg cct
act tcg cta ctg ctg cta ttc cgg gtt tgc ctc tgg aca tga caa cgc gga

10 103 104
arg glu arg gln asn cys gly phe pro gly val thr pro ser gln cys ala
cgt gaa cgg caa aac tgc gga ttc ccg gaa/gta aca ccc tct cag tgc gct
gca ctt gcc gtt ttg/acg cct aag ggc ctt cat tgt ggg aga gtc acg cga

15 105 106
asn lys gly cys cys phe asp asp thr val arg gly val pro trp cys phe
aat aaa ggc tgc tgt ttt gat gac acg gta cgg ggc gtt ccg tgg tgc ttc/
tta ttt ccg acg aca aaa cta ctg tgc cat gcc ccg/caa ggc acc acg aag

20 107 108
tyr pro asn thr ile asp val pro pro glu glu glu cys glu phe
(SED ID NO:26)
tat ccc aat aca att gac gtt ccg cct gaa gaa gag tgc gag ccg taa g
(SED ID NO:16)
atg ggg tta tgt taa ctg caa ggc ctt ctt ctc acg ctc ggc att cttaa
(SED ID NO:36)